



# Nuclear Energy Research Advisory Committee (NERAC)

Office of Nuclear Energy, Science and Technology  
U. S. Department of Energy

March 2003

## Background

The Nuclear Energy Research Advisory Committee (NERAC) was established in 1998 by the U.S. Department of Energy (DOE) to provide independent, expert advice on complex science and technical issues that arise in the planning, managing, and implementation of DOE's civilian nuclear energy research programs. NERAC assists DOE by reviewing the research and development (R&D) activities of the Office of Nuclear Energy, Science and Technology (NE) and providing advice and recommendations on long-range plans, priorities, and strategies to effectively address the scientific and engineering aspects of these efforts. The committee also provides advice on national policy relative to nuclear energy research and development issues as requested by the Department.

The committee operates in accordance with the Federal Advisory Committee Act (FACA) and has a diverse membership with a balance of disciplines, interests, experiences, points of view, and geography from academia, industry, and national laboratory communities. It is organized into seven standing subcommittees that address the major components of NE's research and development efforts. These subcommittees, which are augmented by the staff of NE and have access to experts in the field from other organizations, are:

- *Long-Term Planning for Nuclear Energy Research;*
- *Long-Term Isotope Research and Production;*
- *Operating Nuclear Plants Research and Development;*
- *Advanced Nuclear Transformation Technology;*
- *Space Reactor Technology; and*
- *Generation IV Technology Planning.*

In addition, task forces are constituted to address topics that could impact the future paths of specific R&D program or budgets for on-going activities.

Since its inception, NERAC has completed important studies to assist DOE with its nuclear energy R&D activities:

- *Nuclear Science and Technology Long-Term Research and Development Plan;*
- *Isotope Research and Production Plan;*
- *Nuclear Science and Technology Infrastructure Roadmap;*
- *Future of University Nuclear Engineering programs and University Research & Training Reactors;*

- *Technological Opportunities to Increase the Proliferation Resistance of Global Nuclear Power Systems (TOPS);*
- *Report of the University Research Reactor Task Force;*
- *A Roadmap to Deploy New Nuclear Power Plants in the United States by 2010; and*
- *A Technology Roadmap for Generation IV Nuclear Energy Systems.*

In preparing these reports, NERAC has determined that:

- There is an urgent sense that the Nation must rapidly restore an adequate investment in basic and applied research in nuclear energy if it is to sustain a viable U.S. capability in the 21st century;
- An important role for the Department in the nuclear energy area at the present time is to ensure that the education system and its facility infrastructure are in good shape;
- The capabilities of currently operating DOE facilities will not meet projected U.S. needs for nuclear materials production and testing or research and development; and
- Of particular need over the longer term are dependable sources of research isotopes and reactor facilities providing high-volume flux irradiation for nuclear fuel and materials testing.

NERAC's recommendations for the "Goals of Nuclear Energy" can be found at <http://nuclear.gov>.

## Major FY 2002 Accomplishments

In the past year, in addition to the Committee's role reviewing progress in DOE's nuclear energy program, NERAC completed and approved two major studies relating to the near term deployment of nuclear power reactors and a roadmap for advanced nuclear energy systems.

### A Roadmap to Deploy New Nuclear Power Plants in the United States by 2010

A working group within the NERAC Subcommittee for Generation IV Technology Planning was formed to evaluate the barriers to near term deployment and recommend how those barriers could be overcome. The barriers identified were:

- Nuclear plant economic competitiveness;
- Business implications of the deregulated market;

- Efficient implementation of 10CFR52 (standardized licensing process); and
- Adequacy of the nuclear industry infrastructure.

The recommendations to circumvent these barriers are the use of a “phased plan of action” which includes regulatory demonstrations, design completion, construction and startup; a “dual track” implementation of both large light water reactors and smaller gas cooled reactors; market driven initiatives with DOE cost sharing of <50% of regulatory related generic issues such as demonstration of untested regulatory processes for Early Site Permit and combined Construction and Operating License; government establishing incentives for business risk reduction; and development of a National Nuclear Energy Strategy to complement the National Energy Policy.

#### A Technology Roadmap for Generation IV Nuclear Energy Systems

The roadmap designs and plans the necessary R&D to support a generation of innovative nuclear energy systems known as Generation IV. It established technology goals for these systems in four areas: sustainability, economics, safety and reliability, and proliferation resistance and physical protection.

The roadmap process, during which approximately 100 nuclear energy systems were evaluated, resulted in the selection of six systems for further study and development. The motivation for the selection is to:

- Identify systems that make significant advances toward the technology goals;
- Ensure that the important missions of electricity generation, hydrogen and process heat production, and actinide management may be adequately addressed by Generation IV systems; and
- Provide some overlapping coverage of capabilities, because not all of the systems may ultimately be viable or attain their performance objectives and attract commercial deployment.

The six systems chosen were:

- Gas-Cooled Fast Reactor System;
- Lead-Cooled Fast Reactor System;
- Molten Salt Reactor System;
- Supercritical Water-Cooled Reactor System; and
- Very-High-Temperature Reactor System.

#### **Further Information**

Additional information regarding NERAC and the NERAC documents previously noted are available electronically on the NE website at <http://nuclear.gov>.

**Visit our web site: [nuclear.gov](http://nuclear.gov)**